

Attachment D-2

Specifications & Drawings for the Hawk Dining PV & Battery Storage System

General Project Description

1. This project consists of a conventional grid-tied rooftop PV solar array in conjunction with on-site battery storage and a manual power transfer switch. The battery storage system will allow SOU to provide a minimum level of food service operations during an extended electric utility outage.
2. The system shall be designed so the batteries maintain full-charge from the PV array, with surplus generation flowing to the grid.
3. During an extended utility power outage, the manual transfer switch will allow designated critical building system loads to be served by battery and PV power.

Roof Requirements

1. The Hawk roof plan and building elevations are attached. The intent of this project is to maximize PV output by utilizing the south, east and west sloping roofs where feasible and cost effective.
2. The existing roofing is asphalt composition shingles. The roof structure is plywood over wood trusses. The roof structure has been engineered to accommodate the added PV loads.

PV Racking Systems

1. Tilt angle: Match roof slope
2. Attachment: Basis-of-design is the UNIRAC NXT system, Snap-N-Rack Ultra Rail system or approved equal. All racking components utilized for array equipment grounding shall be listed for that purpose and must be appropriately isolated to prevent galvanic corrosion and subsequent loss of array grounding continuity.
3. Shop Drawings: Provide layout and erection drawings showing dimensioned locations of all frames and roof attachments. Include erection drawings, elevations, and details where applicable.
4. Manufacturer Qualifications: Manufacturer with a minimum five years documented experience in producing pre-manufactured solar collector supporting steel or aluminum frame work.
5. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
6. Manufacturer's warranties. Provide a minimum 10-year manufacturer's workmanship warranty and minimum 5-year finish warranty for the racking system.

Solar Modules:

1. Orientation: South, East, West.
2. Minimum 20-year warranty. Manufacturer must have been in business for at least 10 years under their current name and tax identification number. Warranty must be in the Owner's name. Minimum 80% power output or more, for a period of 20 years. Manufacturer agrees to repair or replace components of PV modules that fail to exhibit the minimum power output within the specified warranty period.
3. PV modules shall be listed and in compliance with UL standard 1703, Standard for Safety. Flat-plate Photovoltaic Modules and Panels. Entire assembly shall be listed and labeled

by a qualified testing agency acceptable to authorities having jurisdiction for electrical and fire safety, Class A, according to UL 1703.

4. PV modules must also meet or exceed IEC 61215 and all other relevant standards.
5. Modules by Silfab, SunPower, Q-Cell, Canadian Solar, or approved equal. All electrical equipment must be U.L. listed.

Inverter(s) and Monitoring:

1. Inverter location: In the mechanical penthouse (see attached drawings).
2. Basis of design: Solar Edge inverters, or approved equal.
3. Provide integrated AC/DC disconnects.
4. Provide necessary inverter communications (hardware and software) to enable SOU to remotely monitor the system output and performance.
5. Data cabling for the offsite monitoring will be provided by SOU.
6. Inverters must be listed with UL 1741SA, "Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources".
7. Installation must comply all elements of the IEEE 1547-2018 interconnection standards.
8. Warranty: The inverters shall have a minimum 10-year warranty. All warranties shall be in the Owner's name.

Electrical Interconnection:

- Provide a solar system AC disconnect per City of Ashland Electric Department requirements as shown on the attached floor plan. Disconnect must be lockable in "ON" and "OFF" positions. Provide permanent labels at equipment per City requirements.
- Furnish and install all wiring, conduit, combiner boxes, and junction boxes for a complete system designed to comply with all building code and local jurisdiction requirements. All exposed wiring must be UV resistant.
- New AC conductors shall be sized so that voltage drop does not exceed 1% at full load. Connections to the facility's electrical system are design-build by the contractor. The facility service is 800 amp. 480-volt, three phase.
- Furnish and install array equipment grounding hardware. Provide PV grounding conductors and Code required bonding hardware.

Battery Storage and Manual Transfer Switch:

- Furnish & install a minimum 125 kWh battery storage system in the mechanical penthouse to enable essential building operations to continue during extended utility power outages.
- The batteries should be engineered for commercial building-scale solar energy storage, Lithium titanate (LTO) batteries or equal are approved.
- The manual transfer switch will disconnect the facility from utility power and enable select essential circuits to operate on PV and battery power. See the attached list of circuits to be powered via the manual transfer switch.
- The battery back up system should be designed to be expandable to allow for enhanced off-grid resilience in future work phases
- The manual transfer and battery storage design shall include all necessary circuiting, panels, disconnects, voltage monitoring, alarms, etc. as required to meet NEC requirements and permit SOU staff to easily switch the building over to standby power.

Required Documentation:

- Roof plan drawn to scale showing all system components and confirmation/coordination with all existing conditions.
- One-Line diagram for entire system. Include all system component specifications and ratings, conductor sizes and types, conduit sizes, ratings of combiner boxes and series OCPD's.
- Location and rating of facility interconnection point.
- Electrical calculations including voltage drops and string sizing calculations.
- Solar collector roof support system design and load calculations including all dead and live (snow, wind, seismic, etc.) loads.

Permitting:

The Design/Builder will be responsible for the preparation of construction drawings and specifications and for submitting documents to the City of Ashland for all required permits. At time of submittal for permitting, the Design/Builder shall provide to the Owner one complete set of permitting documents.

Project Closeout:

At completion of the project, the Design/Builder shall provide to the Owner 1 Operation & Maintenance (O&M) Manual in a 3-ring binder. Include copies of all as-built drawings, diagrams, calculations, product information, specifications, warranties, maintenances instructions, etc. in the O&M manuals. In addition to the printed O&M manuals, provide an electronic copy of all the O&M information prior to request for final payment.

The Design/Builder shall provide system instruction and training to SOU staff prior to final acceptance and payment.

The final product shall be a fully completed, fully functional, code compliant solar photovoltaic system with battery storage, manual power transfer, inverter(s) and monitoring with all equipment and warranties in place, and all permits and approvals secured.

Pricing shall not be submitted where such pricing is contingent on the university's acceptance of a third party's agreement, including but not limited to third-party cooperative procurement agreements. No third-party financing or assigned leases will be associated with this contract.

Enclosures:

Essential Building Electrical Loads (to be connected to battery back-up)

A123-Roof Plan

A321-Building Elevations

E121-Ground Floor Power (as-built)

E122-Attic/Mezzanine Power (as-built)

E403-Electrical One-Line